Citation:

Dabadie H, Peuchant E, Bernard M, LeRuyet P, Mendy F. Moderate intake of myristic acid in sn-2 position has beneficial lipidic effects and enhances DHA of cholesteryl esters in an interventional study *J Nutr Biochem.* 2005 Jun;16(6):375-82.

PubMed ID: 15936650

Study Design:

Randomized Crossover Trial

Class:

A - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

The purpose of this study was to compare the effects of two moderate intakes of myristic acid, considered an atherogenic fatty acid, on plasma lipids.

Inclusion Criteria:

Male members of a Benedictine monastery located in the Southwest of France.

Exclusion Criteria:

- No history of atherosclerotic disease
- No dyslipidemia

Description of Study Protocol:

Recruitment

Twenty-five male members of a Benedictine monastery located in Southwest of France were recruited. Recruitment methods not described.

Design: Randomized crossover trial. Two different test diets were given to 25 monks for for 5 weeks, each separated by 4 weeks of the subject's usual diet.

Blinding used (if applicable): implied with laboratory measures

Intervention (if applicable)

- Baseline diets were provided before each diet
- Both intervention diets provided roughly 2200 kcal and 15% of the energy contribution was

from proteins, 12% from oleic acid, 6% from linoleic acid and 1% from a-linoleic acid.
- The diets were similar in cholesterol content.
- Intakes of fat, SFA and myristic acid were different in the two interventional diets.
- In diet 1, 30% of the calories came from fat (8% SFA, 0.6% myristic acid) and provided 200 mg cholesterol/day
- In diet 2, 34% of the calories came from fat (11% SFA, 1.2% myristic acid) with the same levels of oleate, linoleate, alpha-linolenate and cholesterol

Statistical Analysis

- The Wilcoxon signed-rank test was used for comparison of plasma lipid and fatty acid levels and *P* values <.05 were considered significant.
- Results were expressed as mean ± SD.
- Means of separate measurements for each lipid and lipoprotein variable during the baseline and the two interventional diets were calculated in each subject.
- Differences between baseline and interventional study values and between diet 1 and 2 values were tested by one-factor repeated-measures analysis of variance.
- Pearson's correlation coefficient was used as a measure of the associations between fatty acid intake and fatty acids of cholesteryl esters after the two interventional diets.

Data Collection Summary:

Timing of Measurements

Measurements made at baseline, after 5 weeks on intervention diet 1, after 4 weeks on baseline diet between interventions, and after 5 weeks on intervention diet 2.

Dependent Variables

- Serum lipid profile
- Plasma fatty acids profiles of the phospholipids

Independent Variables

- Diet 1: 30% of the calories came from fat (8% SFA, 0.6% myristic acid) and provided 200 mg cholesterol/day
- Diet 2: 34% of the calories came from fat (11% SFA, 1.2% myristic acid) with the same levels of oleate, linoleate, alpha-linolenate and cholesterol

Control Variables

Description of Actual Data Sample:

Initial N: 25 males

Attrition (final N): 25

Age: aged 35 to 88 years (average 61 years)

Ethnicity: French

Other relevant demographics: None had a history of atherosclerotic disease. All were

nonsmokers. None were taking lipid-lowering drugs or medication affecting lipid metabolism. All were moderately active.

Anthropometrics: weighed 57-87 kg (average 72 kg), body mass index ranged from 32 to 18 kg/m^2.

Location: Belloc Abbey, Southwest France

Summary of Results:

Key Findings

- In comparison with baseline, diets 1 and 2 induced a decrease in total cholesterol, LDL-cholesterol and triglycerides ($P<.001$).
- HDL-cholesterol was not modified and the apo A-I/apo B ratio increased ($P<.001$).
- Plasma triglycerides were lower after diet 2 than after diet 1 whereas HDL-cholesterol was higher ($P<0.5$).
- In phospholipids, myristic acid, oleic acid, linoleic acid, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) increased after diet 2 vs baseline ($P<.01$) and diet 1 ($P<.05$)
- Both diets were associated with an increase in alpha-linolenate of cholesteryl esters ($P<.05$), but only diet 2 was associated with an increase in DHA of cholesteryl esters ($P<0.5$).
- In diet 2, myristic acid intake was positively correlated with myristic acid of phospholipids, and alpha-linolenic acid was correlated with alpha-linolenic acid of cholesterol esters.

Plasma fatty acid profiles of the phospholipids after the two intervention diets

Fatty acids	Baseline diet	Diet 1	Baseline diet	Diet 2
Myristic acid (14:0)	1.01±0.25	0.93±0.21	1.10±0.27	1.30±0.33[b,E]
Palmitic acid (16:0)	27.48±2.54	26.42±1.73[a]	27.23±2.79	26.54±3.01
Stearic acid (18:0)	16.06±4.12	10.84±2.05[d]	16.34±1.47	16.65±2.21
Oleic acid (18:1)	14.10±5.15	17.62±2.27[c]	16.49±1.88	20.83±2.51[e,E]
Linoleic acid (18:2)	30.11±4.57	32.51±2.58[c]	29.24±3.19	34.92±4.57[e,C]
Arachidonic acid (20:4)	6.50±1.17	5.80±2.04	6.10±1.61	6.30±1.45
Linolenic acid (18:3)	0.43±0.14	0.86±0.25[e]	0.53±0.38	0.75±0.23[A]
EPA (20:5)	0.56±0.13	0.73±0.29[b]	0.60±0.33	1.00±0.28[a,D]
DHA (22:6)	2.70±0.65	2.40±0.47	2.50±0.64	2.80±0.58[a,B]
ARA/EPA	12.00±2.60	8.90±4.00[c]	12.40±7.00	6.90±3.00[d,A]

PUFA/SFA	0.81±0.02	1.12±0.05^{e}	0.90±0.08	1.10±0.07^{c}

Values are expressed in % total fatty acids±SD

Means with different lowercase superscript letters are significantly different from baseline diet; means with different uppercase superscript letters are significantly different from diet 1. $^{a,A}P<.05$; $^{b,B}P<.01$; $^{c,C}P<.005$; $^{d,D}P<.0005$; ^{eE} $P<.0001$.

Author Conclusion:

Moderate intake (1.2% of toal calories) of myristic acid has beneficial lipid effects and enhances DHA of cholesteryl esters.

Reviewer Comments:

Small sample size of a relatively homogenous group of men.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	No

2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	N/A
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	No
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes

5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	Yes
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	Yes
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	Yes
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes

	7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**		Yes
	8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
	8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
	8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
	8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
	8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
	8.6.	Was clinical significance as well as statistical significance reported?	Yes
	8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**		Yes
	9.1.	Is there a discussion of findings?	Yes
	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes